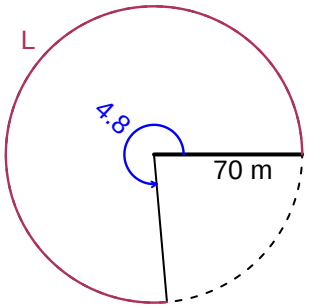
Name: Date:

# Trig Final (SLTN v647)

- You should have a calculator (like Desmos) and a unit-circle reference sheet.

### Question 1

In the figure below, we see a circle and a central angle that subtends an arc. The angle measure is 4.8 radians. The radius is 70 meters. How long is the arc in meters?

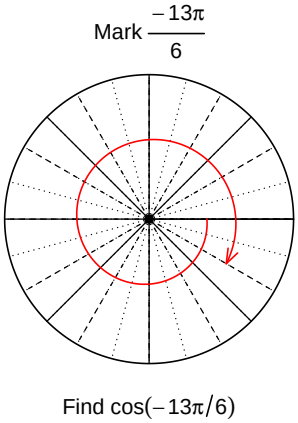



$$\theta = \frac{L}{r} \qquad r = \frac{L}{\theta} \qquad L = r\theta$$

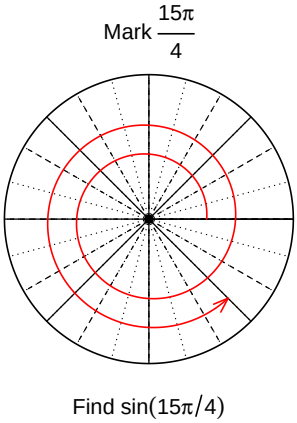
$L = 336$ meters.

### Question 2

Consider angles $\frac{-13\pi}{6}$ and $\frac{15\pi}{4}$. For each angle, use a spiral with an arrow head to **mark** the angle on a circle below in standard position. Then, find **exact** expressions for $\cos\left(\frac{-13\pi}{6}\right)$ and $\sin\left(\frac{15\pi}{4}\right)$ by using a unit circle (provided separately).




Find $\cos(-13\pi/6)$




Find $\sin(15\pi/4)$

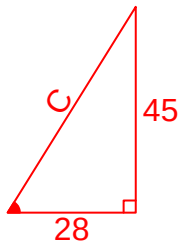
$\cos(-13\pi/6) = \frac{\sqrt{3}}{2}$

$\sin(15\pi/4) = \frac{-\sqrt{2}}{2}$

**Question 3**

If $\tan(\theta) = \frac{-45}{28}$, and $\theta$ is in quadrant IV, determine an exact value for $\cos(\theta)$.

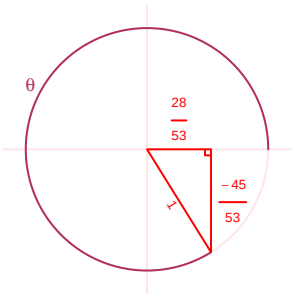
Ignore any negatives and the quadrant, and draw a right triangle (based on SOHCAHTOA) in standard (quadrant I) orientation.




Solve the Pythagorean Equation

$$28^2 + 45^2 = C^2$$
$$C = \sqrt{28^2 + 45^2}$$
$$C = 53$$

Rescale the triangle so the hypotenuse is 1. Reflect the triangle into Quadrant IV in a unit circle.




$$\cos(\theta) = \frac{28}{53}$$

**Question 4**

A mass-spring system oscillates vertically with a midline at $y = -7.27$ meters, an amplitude of 3.68 meters, and a frequency of 2.29 Hz. At $t = 0$, the mass is at the midline and moving down. Write an equation to model the height ($y$ in meters) as a function of time ($t$ in seconds).

Any of these equations would get full credit.

$$y = -3.68\sin(2\pi 2.29t) - 7.27$$

or

$$y = -3.68\sin(4.58\pi t) - 7.27$$

or

$$y = -3.68\sin(14.39t) - 7.27$$